BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
GPS NETWORKING, INC.	)	File No. RM-11002
	)	
Petition for Rulemaking to Market a GPS Re-Radiation Kit	)	

OPPOSITION TO PETITION FOR RULEMAKING AND REQUEST FOR WAIVER

The U.S. GPS Industry Council ("USGPS"), by counsel and pursuant to Section 1.405(a) of the Commission's Rules (47 C.F.R. §1.405(a) (2003)), hereby opposes the above-captioned petition for rulemaking/waiver request filed on May 3, 2004 by GPS Networking, Inc. ("GNI"). In its Petition ("GNI Petition"), GNI proposes to market, on an unlicensed basis under Part 15 of the Commission's Rules, "kits" that would allow users to amplify and re-radiate Global Positioning System ("GPS") signals. If the FCC were to allow such kits to be sold as GNI contemplates, this equipment could easily interfere, intentionally or unintentionally, with signals in the GPS restricted bands, thereby obstructing the vital public safety and national security uses of GPS. Against these potentially catastrophic consequences of permitting use of GPS re-radiating equipment on an unlicensed basis, the potential benefits alleged by GNI are either overstated or of limited value. Accordingly, the GNI Petition must be denied.[1]

---

[1] The GNI Petition also includes a *pro forma* Request for Waiver of Section 2.803 of the Commission's Rules, which prohibits the marketing of unauthorized RF equipment. *See* 47 C.F.R. § 2.803. The FCC's June 25, 2004 Public Notice does not seek comment on this request, and USGPS reserves the right to comment further in response to any future solicitation of comment on this request. In any case, GNI's Request for Waiver fails to provide any basis for waiver of the Commission's Rules, and should be denied for the same reasons that the Commission should deny the Petition for Rulemaking.

The central premise of the GNI Petition is that the Commission should permit it to market its GPS re-radiation kits on an unlicensed basis under the cover of an existing rule that applies to tunnel radio systems – Section 15.211 (47 C.F.R. § 15.211). *See* GNI Petition at 12-13. Benefits to various classes of potential users are alleged, but GNI never even attempts to explain either of the two critical underpinnings that implicitly follow from its proposed approach – (1) that it is appropriate for its kits to be operated without users obtaining FCC licenses, and (2) that its proposed use is similar to that permitted under Section 15.211 of the FCC's rules, which it proposes to amend. Neither premise is supportable.

A substantial portion of the GNI Petition is devoted to discussion of the potential use of its product by a variety of entities – fire departments, rescue squads, the armed forces, defense contractors, aircraft maintenance facilities, and underground parking garages. *See* GNI Petition at 7-10 & 17-19. Each of these categories of possible users would require such a device at a specific location or for a specific purpose. GNI never addresses, however, how any of these entities would derive a particular benefit from authorization of the GNI kits on an unlicensed basis. Unlicensed use of spectrum is typically allowed where the dangers of harmful interference are low and the devices to be used have widespread utility to a multitude of individual users – *e.g.*, many consumer products that re-radiate or transmit RF energy are permitted on an unlicensed basis. Under such circumstances, requiring each user to obtain its own license can be unduly burdensome and pose an obstacle to the use of otherwise beneficial products.

These considerations do not apply to GNI's product. All of the classes of users cited by GNI are very capable of seeking situation-specific authorizations for the

particular GPS enhancements they require. Indeed, many of the users envisioned for GNI's product are government agencies that could easily make FCC or NTIA approval part of their procurement process.

GNI itself notes multiple reasons why it is necessary for the Commission to have oversight of the particular circumstances under which any non-government GPS re-radiating device might be used. For example, it notes that use of its kits "could pose an interference problem if both signals were generated outdoors," and acknowledges that some situations might require an operator to employ kill switches, hooding and/or shielding of the re-radiator. GNI Petition at 16. The need for such precautions clearly demonstrates that the Commission would require far more information about the particular uses of each GPS re-radiator than for those items currently permitted as unlicensed devices.

Strict protections not available where unlicensed use is permitted are necessary because of the potential for misuse or outright abuse of GPS re-radiation devices. As GNI acknowledges, GPS is a critical part of the U.S. public safety and national security infrastructure. *See* GNI Petition at 5 n.1. Because of this role, the GPS bands are "restricted" and thus generally off-limits to Part 15 devices of any kind. *See* 47 C.F.R. § 15.205. A GPS re-radiator, however, can be used to "spoof" GPS signals, degrading the accuracy of position-location.[2] Terrorists could employ these devices to thwart the use of GPS-guided munitions against high-value targets or to impede emergency response to a domestic terrorist attack.

Although GNI argues that enhancing the accuracy of E911 location using GPS is an important supporting justification for its proposal, the amplification and re-

---

[2] *See, e.g.,* GNI Petition, Exhibit B at 17-19 (test results showed that indoor use of GPS re-radiator caused nearby outdoor reception of GPS signals to report "fluctuating readings caused by GPS signals received from both the [Equipment Under Test] and the satellites.").

radiation of GPS signals could have a substantial *negative* impact on E911. There are millions of mobile telephone users today who rely on E911 functionality anywhere there is a cellular telephone signal available. Locations where users are accustomed to receiving cellular telephone service include office buildings, markets, and shopping malls, all places that could be subject to interference from an indoor GPS re-radiation device. In these circumstances, the presence of these signals would very likely result in the transmission of erroneous or conflicting position information to emergency responders at times when accurate information is needed most.

Any GNI re-radiated GPS signal that penetrates outside the indoor environment would also interfere with the accuracy of E911 position location in the area. GNI asserts that testing conducted by MET Labs demonstrates "significant signal attenuation" caused by "common building materials." GNI Petition at 10 n.2. Examination of the actual report, however, shows that certain types of building materials caused either no attenuation of the signals or only marginal deviations from baseline measurements. *See* GNI Petition, Exhibit B at 10-11. Widespread use of the GNI kits could therefore significantly degrade the accuracy of E911 service.

Given its own acknowledgement that proper use of a GPS re-radiator requires employment of specific precautions to avoid interference, it is peculiar that GNI seeks to permit general use of these devices pursuant to a rule that currently applies only to the limited circumstance where a system "is contained solely within a tunnel, mine or other structure that provides attenuation to the radiated signal *due to the presence of naturally surrounding earth and/or water.*" 47 C.F.R. § 15.211(a) (emphasis added). GNI proposes to take this narrow rule and graft onto it a provision that would generally permit use of its

kits in any "indoor" environment, where signals, at best, would be attenuated by brick or concrete walls, or by an airplane fuselage. *See* GNI Petition, Attachment A. On the other hand, such signals might be impeded only by layers of wood and wallboard or a pane of glass, or completely unattenuated due to passage through an open door or window. The variety of circumstances under which GNI envisions use of its equipment belies any comparison to the existing rule applicable solely to tunnel radio systems.

GNI's effort to employ Section 15.211 also overlooks the real world conditions under which these devices would operate, minimizing the obstacles to successful use and overstating the disadvantages to users not using re-radiation technology. One such example of the former is GNI's contention that use of the kits in underground garages could enhance the effectiveness of the E911 system. Many E911 capable devices can capture the GPS signal indoors, even under conditions with up to 20 dB attenuation, and provide accurate position information via a cellular telephone network. The GNI system, on the other hand, re-radiates a signal from a rooftop antenna, which would not meet the E911 requirements for accuracy. In some circumstances, therefore, the use of this equipment would degrade the accuracy of E911 location that would otherwise be available through use of existing equipment.

Similarly, GNI overstates the present disadvantages to use of GPS indoors or following a period of shielding during which access to GPS signals was unavailable. For example, the GNI Petition states in several places that GPS receivers require "three to five" minutes to provide a position after being turned off or out of satellite view. *See* GNI Petition at 5 n.1, 7, 18 & 19. In fact, GPS receivers store satellite almanacs in nonvolatile memory, so that in most cases there is no need to collect this information every time the

device is turned on. Receivers need only to access current satellite position data, a process that takes less than one minute, not five minutes. Moreover, GPS receivers used for E911 purposes have enhanced signal acquisition and reception capabilities that allow successful use indoors. GNI thus exaggerates that extent of the benefits that could accrue from the use of such devices.

Dr. A.J. Van Dierendonck has prepared a technical analysis that describes the many serious concerns, limitations and shortcomings of the GNI proposal. *See* Attachment. Dr. Van Dierendonck's attached analysis is hereby incorporated by reference and is an integral element of this opposition.

Conclusion

Accordingly, for all of the foregoing reasons, the Commission should reject GNI's proposed rule change, and decline to take further action in response to the GNI Petition. If the Commission is going to permit any use of GPS re-radiating devices, it must be pursuant to individual licenses, appropriately conditioned to the circumstances of each licensee's use. Such uses must be strictly limited to those where no interference to normal GPS operations will occur.

Respectfully submitted,

THE U.S. GPS INDUSTRY COUNCIL

By: _____
Raul R. Rodriguez
David S. Keir

Leventhal, Senter & Lerman P.L.L.C.
2000 K Street, N.W., Suite 600
Washington, D.C. 20006
(202) 429-8970

July 26, 2004

Its Attorneys

Comments on GPS Networking Petition for Rulemaking and Request for Waiver

AJ Systems

For the US GPS Industry Council

Comments Summary 1

- The petition shows a lack of understanding of GPS receivers and their performance
- The petition exaggerates the benefits of GPS signal re-radiation, misleading the readers of the petition
- The petition ignores implementation problems
- The petition misstates the test results/conclusions

Comments Summary 2

- The petition states government agency approval without proof
- The petition ignores the impact of the re-radiation equipment falling in the wrong hands (jamming, spoofing)
- The petition does not justify why the GPS re-radiation equipment needs to be unlicensed

Lack of Understanding of GPS Receivers and Their Performance 1

- The petition states many times that GPS receivers require "a few minutes" to provide a position after being turned-off or out-of-view of satellites
  - States requirement to collect satellite almanacs
- This is not true
  - GPS receivers store satellite almanacs in nonvolatile memory – no need to collect
  - E911 receivers receive information from cell network
  - All receivers store previous position
- Thus, impact is overstated
  - "A few minutes" is more like 30 seconds
    - Time to collect satellite position data
    - Even for a moving vehicle

Lack of Understanding of GPS Receivers and Their Performance - 2

- The petition does not account for the performance of E911 GPS receiver enhancements
  - Basics of E911 requires contact with cell network
  - Receiver receives acquisition information continuously for cell network
    - Can acquire and track through approximately 20 dB of attenuation, or more
- Lack of indoor operation of GPS is misstated
  - Especially for E911 application

Exaggeration of the Benefits of GPS Signal Re-radiation - 1

- Benefit for E911 application will actually be a detriment
  - Low level interference to lower level signals
    - Increased range of harmful interference
  - Roof-top position does not meet E911 mandate accuracy requirements
    - Reported position far from actual position, causing rescue attempt to take longer, or no rescue at all

Exaggeration of the Benefits of GPS Signal Re-radiation 2

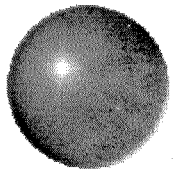
- Re-radiation for paratroopers will interfere with aircraft's navigation system
  - Radiation will pass through aircraft windows and door seals to primary GPS antenna
  - DoD has other means to communicate position to paratroopers

Exaggeration of the Benefits of GPS Signal Re-radiation - 3

- In short tunnels, re-radiation is not necessary
  - Position entering the tunnel is better than position of re-radiating antenna
- In long tunnels, multiple re-radiation would be required
  - Unless largely separated, re-radiators will interfere with each other
  - If separated, receivers will break lock and have to reacquire between individual coverage
    - Velocity information would be suspect and misleading, or none at all (from one antenna)
      - How will receivers react to this?

Exaggeration of the Benefits of GPS Signal Re-radiation 4

- Calibration of Navigation Systems
  - Calibration with wrong position provides erroneous calibration data
  - Inertial Systems require motion for good calibration, much less correct position for initialization



Ignoring Implementation Problems

- Coverage problems
  - Long tunnels
    - Multiple re-radiators?
  - Large parking complexes
    - Multiple re-radiators?
  - Distance to receiving antenna
    - Erroneous position reported
    - Additional loss

Misstatement the Test Results/Conclusions

- The petition states that attenuation protects GPS users outside of buildings, but test results clearly show otherwise
  - See Exhibit B, Test #1, Page 11 of 25
  - Most wall materials exhibited less than 6 dB attenuation
- Testing was accomplished using the wrong kind of GPS receiver – should have used one designed for E911 operation (or aviation)
- Test criteria (position fix) used is subject to too many uncertainties
  - Doesn't account for scenarios where a weak GPS signal is a critical signal

Implies Government Agency Approval Without Proof

- The petition implies that FAA approved the use of the re-radiations, but no proof of that approval was given
  - It is doubtful that approval from the FAA was given, at least not from the right branch of the FAA
  - Hangar doors and windows can be quite close to LAAS Reference Receiver antennas
  - Based upon personal contact with FAA, licensing will be required

Impact of Equipment Falling into the Wrong Hands Ignored

- The GPS Re-Radiator can be used to "spoof" or jam the GPS signals
  - The test results showed that – see Exhibit B, Test #2, pages 17-19 – fluctuating positions reported
- The GPS Re-Radiator is an "Optimum Jammer", jamming with the ideal jammer spectrum
- If unlicensed, anyone can purchase one
  - Our enemies
  - Terrorists
  - Hackers
- At least, the use of such devices should be licensed

No Justification Why the Re-Radiation Equipment Needs to be Unlicensed

- The re-radiator can not be considered Consumer Electronics
- Specialized applications only – mostly Government Agencies
- Should this equipment be licensed to reduce proliferation and use by enemies, terrorists and hackers?

TECHNICAL CERTIFICATE

I, Dr. A.J. Van Dierendonck, hereby certify, under penalty of perjury, that I am the technically qualified person responsible for the preparation of the technical discussion contained in the foregoing Opposition to the Petition for Rulemaking and Request for Waiver filed by GPS Networking, Inc., that I am familiar with Part 15 of the Commission's rules, and that I have either prepared or reviewed the technical information submitted in this pleading and found it to be complete and accurate to the best of my knowledge and belief.

July 26, 2004

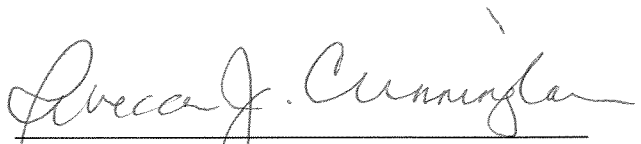
By: A.J. Van Dierendonck

Dr. A. J. Van Dierendonck
AJ Systems/GPS Silicon Valley

CERTIFICATE OF SERVICE

I, Rebecca J. Cunningham, hereby certify that a true and correct copy of the foregoing Opposition to Petition for Rulemaking and Request for Waiver was sent by first-class, postage prepaid mail this 26th day of July, 2004, to the following:

Anne E. Linton, Esquire
Washington Federal Strategies
Suite 710
4601 North Park Avenue
Chevy Chase, MD 20815



Rebecca J. Cunningham